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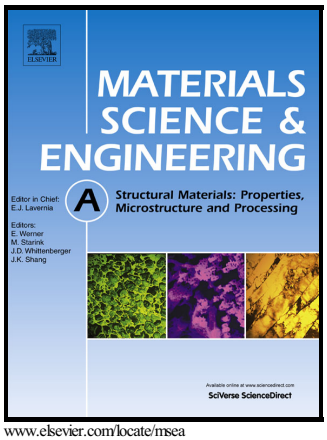

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ACCEPTED MANUSCRIPT

Stress corrosion cracking of a Zr-based bulk metallic glass

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Abstract

The stress corrosion cracking behaviour of the bulk glassy $Zr_{52.5}Cu_{17.9}Al_{10}Ni_{14.6}Ti_5$ alloy (Vitreloy 105) in 0.01 M Na_2SO_4 + 0.01 M NaCl electrolyte was investigated under static three-point bending and anodic potentiostatic control by means of in situ stress and current measurements and subsequent fractography analysis. Pitting takes place preferentially at edges of flat rectangular samples and those pits act as precursors to cracking. Features corresponding to shear banding, mechanical brittle cracking and anodic dissolution assisted cracking were found on the fracture surface. The presence of striations indicates a discontinuous step-wise crack propagation mode. A mechanism is proposed in which crack tip blunting is attributed to shear banding and re-sharpening is attributed to preferential anodic dissolution along shear bands.

Keywords (according to list provided by MSE-A): mechanical characterization; bulk amorphous alloys; casting; fracture; shear bands.

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